DOCUMENT RESUME

ED 121 929 UD 015 990

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TITLE Nine-Year Follow-Up Study of Montessori Education.
PUB DATE [76]
NOTE 9p.

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage
DESCRIPTORS Educational Alternatives; Educational Assessment; Educational Environment; Educational Innovation; *Educational Philosophy; Educational Principles; *Educational Theories; Elementary Education; *Followup Studies; Grade 6; *Program Effectiveness; *Program Evaluation; Success Factors
IDENTIFIERS *Montessori Education

ABSTRACT

Results of an earlier six-year followup study demonstrated that a group of children with four years of Montessori education, including preschool and primary . school, score best on all seven variables of the third grade level Metropolitan Achievement Test (MAT). The group with no preschool experience scored lowest on five of seven variables of the test. The children in the highest scoring group had been in at least two different Montessori schools with as many as three different teachers. The strong positive results indicate that the common elements of the Montessori philosophy withstood the exigencies of being set forth by several teachers. The purpose of this nine-year followup is to investigate whether these positive effects are maintained up to sixth grade level. Twenty-eight of the 77 students evaluated at the third grade in the earlier study are again compared on MAT scores. Although no statistically significant results are obtained, those groups of children who had early Montessori training generally score higher on sub-tests of the MAT administered at sixth grade level than do those children who had Head Start or no preschool. Results obtained on the third grade MAT of those same children show similar but more brilliant results. Results of the study tend to re-confirm the importance of preschool experience for disadvantaged children. Research questions are listed. (Author/AM)

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ED121929

Nine Year Follow-up Study of Montessori Education

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Montessori education has been a focus of research efforts in several departments of the University of Cincinnati since 1965. Previous research both by Dr. Thomas Binta and by Dr. Ruth Gross suggested, "...considerable promise for the Montessori approach in fostering a wide range of desirable behaviors in elementary school-age children."[1] These early studies examined performance on a number of variables including curiosity, creativity, innovative behavior, motor impulse control, reflectivity, social competence, self-concept and some aspects of conventional intelligence. Although many of these variables relate to school performance, academic achievement levels were not examined in the previous research.

The Six Year Follow-up Study by Sciarra and Dorsey[2] evaluated whether or not early and continued exposure to Montessori education makes a difference in later academic achievement. Third grade children who had varied preschool and primary school experiences were evaluated and compared in both verbal and mathematics skills as measured by the Metropolitan Achievement Test (MAT). The groups studied included: Group 1, children with four years of Montessori education including preschool and primary school, Group 2, children with two years of Montessori preschool education, Group 3, children with one year of Head Start prior to kindergarten, and Group 4, children with no school

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1. Gross, Ruth B., Green, Bonnie L. & Clapp, Donald F. The Sands School Project, The American Montessori Bulletin, 1973, Vol.11, No.1, 16.

2. Sciarra, Dorothy June and Dorsey, Anne. Six Year Follow-up Study of Montessori Education, The American Montessori Bulletin, 1974, Vol.12, No.4.

experience prior to kindergarten. Although the original intent was to study possible differences between groups which would include social adjustment and personality development as well as academic achievement, (as suggested by Gross, et al in their report on the Sands School Project[1]), it became clear that the constraints of doing longitudinal research in the natural setting made it necessary to narrow the scope of that study as well as this nine year follow-up study to a comparison of groups based on available data from a standardized achievement test.

The results of the six year follow-up study clearly demonstrated that the group with four years of Montessori education, including preschool and primary school, scored best on all seven variables of the third grade level Metropolitan Achievement Test (MAT). The group with no preschool experience scored lowest on five of seven variables of the MAT. Scores on the MAT for the group with two years of Montessori education and the Headstart group fell somewhere between the other two groups but there was no consistent ordering of those scores. The children in the highest scoring group had been in at least two different Montessori schools with as many as three different Montessori teachers. Therefore, the results of the earlier study strongly imply that the common elements of the Montessori philosophy withstood the exigencies of being set forth by several teachers, yet produced strong positive results. The purpose of this nine year follow-up study was to investigate whether these positive effects were maintained up to sixth grade level.

1. Gross, Op.cit.,pg.17

POPULATION AND PROCEDURES

Twenty-eight of the 77 subjects evaluated at the third grade level in the earlier study were again studied at sixth grade. Table I shows the number of subjects in each group in the six-year follow-up and the nine year follow-up studies.

TABLE I

DISTRIBUTION OF SUBJECTS

	3rd grade	6th grade
Group 1 Four years of Montessori education (Montessori preschool and primary school)	N=10	N=9
Group 2 Two years of Montessori education (Montessori preschool only)	N=35	N=10
Group 3 One year of Headstart (no Montessori education)	N=13	N=10
Group 4 No preschool education (no Montessori education)	N=19	N=9

A thorough search of available sixth grade records on all subjects from the earlier study yielded test scores on approximately one half of those studied at the third grade level. The authors are unable to explain the overwhelming loss of subjects in Groups 2 and 4.

The MAT for sixth grade testing includes five variables: namely, Word Knowledge (WK), Reading (RD), Math Computation (MCM), Math Concepts (MCN), and Math Problem Solving (MPS). Scores from these variables were used in the present analysis to determine whether measurable effects of Montessori education were manifest at the sixth grade level.

ANALYSIS OF DATA

The first aspect of the data examined was age of each child at time of taking the MAT. All children were tested in October of their sixth grade year. Ages ranged from 10 years, 10 months (130 months) to 12 years, 8 months (152 months). Since there was such a wide range of ages (22 months), the ages of each group were examined to determine whether or not there were important differences. The group ranges and means can be found in Table II.

TABLE II

AGE IN MONTHS AT TIME OF 6th GRADE MAT TEST

Group	Youngest Age	Oldest Age	Mean Age
1	130	149	139.55
2	130	151	137.90
3	133	145	138.20
4	131	152	140.22

The total group age mean was 138.96 months. Since the broad age span was reflected in all four groups and since the means were not significantly different, age was not used as a factor in this study.

The second aspect of the data which was examined was mean scores on each of the five subtests of the MAT. Mean scores were computed for each group for each subtest. Results may be found in Table III.

TABLE III

MEAN SCORES ON SIXTH GRADE MAT

	1	2	3	4
WK	73.88	69.90	62.90	65.11
RD	61.55	65.80	62.00	59.66
MCM	77.55	78.00	77.90	72.00
MCN	76.33	69.30	74.80	69.00
MPS	76.55	69.44	75.10	72.33

TABLE IV

RANGE OF SCORES ON SIXTH GRADE MAT

	1	2	3	4
WK	48-93	53-103	31-98	55-74
RD	35-84	48-89	29-88	42-71
MCM	67-95	63-96	65-93	63-79
MCN	67-90	60-83	64-88	66-72
MPS	62-91	47-84	59-92	56-86

Although there were nine subjects in groups 1 and 4, and 10 subjects in Groups 2 and 3, there were two individual scores missing from the data. Therefore, Group 4 Reading encompasses only 8 scores, while Group 3 Math Problem Solving contains only 8 scores.

Table IV shows the range of scores on each of the MAT subtests by group. The differences among the group means were not found to be statistically significant. Observation of the means, however, shows that Group 1 children scored higher on three of four tests, (WK, MCN, and MPS) than did children from any other group. Group 2

subjects scored highest on the remaining two tests, (RD and MCM). This is consistent with earlier findings. The same children at the third grade level were tested with the third grade MAT. At that time, Group 1 scored significantly higher than the other three groups on Word Analysis and Math Problem Solving.[1] In the sixth grade MAT, Group 4 children (those who had had no preschool) scored lowest on three of five tests, (RD, MCM, MCN) while Group 3 subjects were lowest on one test (WK), and Group 2 subjects were lowest on one test (MPS). However, a binomial test showed that these results (scoring highest or lowest on three of five subtests) were not statistically significant ($p < .08$). It should be noted that this level of probability approaches significance.

Although their mean scores were highest in WK and MPS, Group 1 did not contain the highest score in these two subtests. It was not, then, one high scoring child who pulled the group mean up. However, the highest score on MCN did appear in Group 1, the group with the highest mean on that subtest. Group 4, which had the lowest mean scores on three of five subtests, did not have the lowest scores on any one of these three tests.

1. Sciarra, Op.cit.

CONCLUSIONS

Although no statistically significant results were obtained, those groups of children who had had early Montessori training generally did score higher on subtests of the MAT administered at sixth grade level than did those children who had had Head Start or no preschool. Results obtained on the third grade MAT of these same children showed similar but more robust results.

Since the number of subjects able to be located was small, certainly no broad generalizations can be made. However, this small population had spent three or more years in public schooling in a wide range of classrooms under the direction of a variety of teachers. Despite this, the children who had received early Montessori training were still scoring higher on the MAT, with the children who had had four years of Montessori scoring higher on the largest number of tests (three) and the children who had had two years of Montessori scoring highest on the remaining two tests.

Although the sample size was small, the results of this study tend to reconfirm the importance of preschool experience for disadvantaged children. Those children with no preschool experience again scored lowest on the largest number of tests (three) after having spent six years in elementary school.

The data certainly suggest that further exploration of the long range effects of early Montessori training is needed. In addition, attention should be given to the delineation of the differences between

Montessori education and non-Montessori education since the Montessori schooling which these subjects received occurred in several settings under the direction of teachers with a wide range of teaching styles. It has been impossible to identify specific differences between Montessori and non-Montessori education. Yet apparently these differences are present since the children perform differently on standardized achievement tests (significantly so at the third grade level).

These results lead to a number of questions for further research:

Should more children attend Montessori programs?

Should Montessori methods be taught to other teachers?

Do similar results hold true for children from different socio-economic classes?

Should Montessori training begin at a later age (for example, age of entry to public school--kindergarten or first grade)?

Should Montessori training be continued beyond primary schooling to maximize its effectiveness?

Answers to these questions and others which grow out of continued study could help educators and parents make more knowledgeable decisions about innovation in education and the direction it may take if the goal is to maximize academic achievement.